

CLAIMS:

- 5 1. Method for producing a micromachined layered device comprising a membrane layer and a first layer on one side of the membrane layer and a second layer on the opposite side of the membrane layer, the method comprising the following steps:
- 10 a) a membrane layer is applied on a substrate;
b) a window in the substrate is opened so as to free the membrane layer in order to enable the adding of layers from both sides of the membrane layer while the substrate is made into a frame that supports the
15 membrane layer during the processing;
c) at least one layer is added on each side of the membrane either simultaneously or on one side at a time;
d) the device is cut out and removed from the substrate
20 frame.
2. Method for producing a micromachined layered device according to claim 1 wherein step b) is made through any of the following methods: laser ablation, wet chemical
25 etching, solvating, dry etching including reactive ion etching and sputter etching.
3. Method for producing a micromachined layered device according to claim 1 or 2, wherein step d) is made
30 through any of the following methods: wet chemical etching, reactive ion etching, dicing/sawing, cutting with scissors or a knife, laser ablation, or punching.
4. A method for producing a micromachined layered device
35 according to any of the preceding claims, wherein steps a-d can consist of a patterning step, to alter the

lateral dimensions/, using for instance photolithography or soft lithography.

- 5 5. Method for producing a micromachined layered device, according to any of the preceding claims, wherein the substrate is made of a polymeric material, a semiconductor material such as silicon, a metal such as, titanium, an alloy such as stainless steel, or glass.
- 10 6. Method for producing a micromachined layered device, according to any of the preceding claims, the method may include the adding of further layers wherein any of the layers, including the membrane layer(s), may consist of a layer of a metal, metal oxides, or an alloy of metals, including gold, platinum, titanium, stainless steel, aluminiumoxide, and a nickel-titanium alloy. Also ceramics, such as hydroxyapatite can be used as a device layer.
- 15 7. Method for producing a micromachined layered device, according to any of the preceding claims, the method may include the adding of further layers wherein any of the layers, including the membrane layer(s), may consist of a layer of a conducting polymer, including pyrrole, aniline, thiophene, para-phenylene, vinylene, and phenylene polymers and copolymers thereof, including substituted forms of the different monomers.
- 20 8 Method for producing a micromachined layered device, according to any of the preceding claims, the method may include the adding of further layers wherein any of the layers, including the membrane layer(s), may consist of a layer of a polymer including polyimide, polyamide, polyurethane, poly-(tetrafluorethylene), poly-(dimethylsiloxan) (silicon rubber), poly(methylmethacrylate), polyesters, poly(vinyl

chloride), and polyethylene including copolymers and substituted forms of the different monomer thereof, epoxies, resins, and composites.

5 9. Method for producing a micromachined layered device, according to any of the preceding claims wherein first step a) is being performed consisting of the first layer of the device being deposited on the substrate layer; hereafter, in step b) the substrate being selectively
10 removed, e.g. by wet chemically etching, under the first layer over an area that at least is slightly larger than the final device size; hereafter, in step c) when the membrane is freely hanging in the substrate support frame and can be accessed from both sides for additional
15 processing, further at least one layer is added on each side of the membrane either simultaneously or at one side at a time; subsequently in step d) the device is removed from the frame.

20 10. Method for producing a micromachined layered device, according to any of the preceding claims, wherein step d) is divided into two steps, where the device is partially cut out in a first step, then activated, followed by a step where the device is completely cut out from the
25 substrate.

11. Method for producing a micromachined layered device, according to any of the claims 1-9, wherein the device is an actuator and wherein the method comprises a step e)
30 where the actuator is activated following step d).

12. A device produced by the method according to any of the preceding claims.

35 13. A device according to claim 12 the device is a microactuator.